

Electrodeposition of Zinc Microwires from an Alkaline Solution at Room Temperature
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Deposition of metallic zinc most often occurs from acid chloride or alkaline cyanide containing solutions. Commercial zinc plating baths will often contain additives such as polyvinyl alcohol, polyaliphatic amines or aromatic aldehydes which are added to help control brightness and uniformity of the deposit. In an effort to discover new plating bath additives that control morphology of metallic crystals, our research is investigating additives that originate from relatively rare natural minerals that are found in very few alkaline desert environments. Hanksite is an unusual mineral with a formula of $\text{Na}_{22}\text{K}(\text{SO}_4)_9(\text{CO}_3)_2\text{Cl}$. The mix of ions can be reproduced in solution, but hanksite has never been synthesized in the laboratory. It is our hypothesis, that this inability to grow hanksite may be due to the absence of biological components which actively adsorb onto the surfaces of crystals inhibiting their growth. This provides an interesting model for investigating the crystal growth modifying properties of biologically produced natural compounds. While differences between the natural and synthetic solutions have not been found to date, a number of other unexpected results have been discovered. Results, so far, include the deposition of zinc microwires by decoration of the step edges of highly oriented pyrolytic graphite (HOPG) and unusual star shaped crystals.